

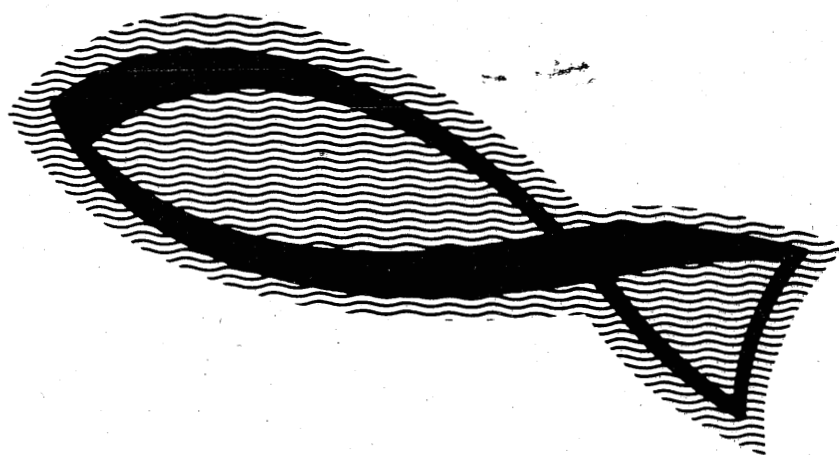


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Eel Research in 1975



by

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DEPARTMENT OF AGRICULTURE AND FISHERIES
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DUBLIN.1.

Eel Research in 1975

by

Christopher Moriarty

Project Completed:

The national survey of Irish eel stocks was completed in 1975. A definitive report is being prepared and will be published later. The work began eleven years ago and the final phase was a study of the eels in the River Barrow. We have now searched for eels in coastal lagoons, in river estuaries, rich lakes, poor lakes, mountain streams and lowland rivers rich and poor.

This has provided a picture of how and where quantities of eels may be found, how they may best be fished for and managed and how the stocks may be improved for the benefit of the fishermen. The stocks are definitely low, although the annual output of eels is of the order of one hundred tons with a value of over £100,000. About two-thirds of this catch came from the Shannon fishery. In general, fishing is intensive and the scope for improvement in fishing methods is limited. Stocking with elvers, however, can greatly increase the catch in the long term and at a value of £1,000 a ton it is clearly worthwhile to go to work on this. The Electricity Supply Board has in fact been engaged in restocking for many years and can expect an increased yield in the near future.

Present and Future Work:

The River Barrow study was the first to be made in a lowland river with a plentiful supply of fish food. The numbers of eels were high, showing that elvers were able to pass upstream without meeting any serious obstructions. A very interesting point was that a few weeks before experimental fishing began, the river had suffered a severe fish kill which apparently had no effect on the eels.

The search for elvers at river mouths continued - where steady supplies are located they may in future be used for stocking other waters. The River Erriff again proved fruitful in this regard.

Naturally the national survey could not cover every eel-bearing lake or river in the country and the plans for the future will include studies of the less important waters. The principal emphasis of future work will be to revisit the waters surveyed in the past. Some, like Lough Derg, will be sampled on an annual basis, others at less frequent intervals. Eel populations are not static and it is most important to find out how they change in the long term.

The South Sloblands Channel in Wexford has shown a steady increase in numbers of eels since intensive fishing took place in 1971. Numbers should be back to the pre-fishing level in 1976, a period which fits in well with predictions made in 1970 based on the determination of the ages of the eels sampled then. The Lough Derg population seems to have levelled out at the 1974 figure but this is only a tentative conclusion and will need to be backed by a study lasting over several more seasons.

Measurements of eels made by E.S.B. staff will become extremely interesting in future and will provide valuable information on the time taken for male eels to develop and on the effects of the stocking programme in the Upper Shannon.

This leaflet gives details of the results of work from autumn 1974 to 1975.

Lake and River Eels:

The Barrow has traditionally provided a good yield of silver eels. Most of them are caught at the locks of the navigation canal and some at

milldams. The exact production figure is unknown but is probably of the order of one or two tons a year. Two fyke-net samples were taken in August 1975 at Levitstown; one in the canal and one in the main river.

The average catch per day for ten nets in the river was 128 eels; the densest eel population yet recorded in freshwater in Ireland. This was an amazing result. The stretch of the Barrow in question, between Athy and Carlow, is severely polluted and was said to have no fish life whatever. Apparently the eels survived. Unlike other fish they are able to lie torpid in the mud for long periods and are therefore exceptionally resistant to the effects of pollution. The population in the canal was much smaller, at 45 eels per ten nets, but still well above average. The food of the eels was mainly water louse, an organism which, like the eels, can tolerate poor water conditions.

In Lough Cutra the catch in 1975 was lower than it had been the previous year. The proportions of eels of more than 50 cm were the same in each year but the proportion of small eels had fallen. This suggests that very few elvers or young eels have made their way into the lake for some years. It is hoped to stock Lough Cutra with elvers for a long-term experiment on growth and population studies.

When Lough Derg was sampled in 1974, five years after the previous survey, the population was found to have nearly doubled. Netting in the same place in 1975 showed no further increase in numbers and the tentative conclusion is that the shallow waters of the lake have now reached their maximum population. On the other hand, the population in the deeper parts of the lake (from 14 m down to 26 m) appeared to be increasing. This was an especially interesting result since it had been thought that eels in Lough Derg would be confined mainly to the shallow parts of the lake. As in the case of Lough Cutra it will take some years of regular sampling to

confirm the present theories. A rather surprising observation was that, while many of the deep-water eels in 1974 had been feeding on cladoceran water fleas, these were absent from the stomachs of the 1975 sample. Catch figures are given in Table 1, length distributions in Table 2.

Estuarine Eels:

Commercial eel fishing in the Broadmeadow Estuary, Co Dublin ceased in 1971 when the stocks had been seriously depleted. Experimental fishing took place annually from 1972 and in 1974 the catches showed a marked increase: from 12 to 71 eels per ten nets. Commercial fishing began again in 1975.

The Broadmeadow eels feed on marine worms and crabs and grow relatively fast. Most of the specimens caught by fyke netting are aged between 7 and 10 years and very few of less than 5 years old are caught. This means that when the estuary has been over-fished it takes about four years for the stocks to recover.

The development of the eel stocks of the South Sloblands Channel Co Wexford, has been closely studied since 1970. The eels were first sampled in 1970 when it was found that the area had the greatest population density in the country. The majority of the eels caught were aged between 7 and 12 years. Intensive fishing took place in 1971 and reduced the numbers to a very low level. Fishing has since then been suspended to allow the stocks to recover. Annual samples have been taken and showed that in 1975 the population density was approaching the 1970 figure so that profitable fishing could take place again in 1976.

A pilot experiment on the feeding movements of the eels in the South Sloblands was made in 1975. The fyke nets are always set in long straight trains and capture the eels which swim into them from either side of each

train. These eels are believed to be swimming at random as they hunt for their food in the mud. When several trains of nets are used they are normally set at distances of a few hundred metres apart from each other so that there is no risk of one net "poaching" from an adjacent one.

In the experiment four trains of nets were set close together in parallel lines. The outer two would be expected to make the biggest catches since the eels swimming up to them would have an unimpeded approach from one side. The inner nets should catch fewer. As the distance between the nets is increased the inner two should catch more eels until a point is reached when all four make equal catches. The trains were set ten metres apart on August 6 and twenty metres apart on the following night. The depth of the water was about one metre. The catches from the end net in each train were discounted so that the figures represent the totals caught by six nets per train. The numbers of eels in each train are given below, ~~nets A~~ and D forming the outer trains.

	<u>Distance between trains</u>		<u>10 metres</u>		<u>20 metres</u>	
			<u>No.</u>	<u>%</u>	<u>No.</u>	<u>%</u>
Train A			19	25	71	33
B			11	15	32	15
C			18	24	58	27
D			27	36	56	25
			<hr/>	<hr/>	<hr/>	<hr/>
Totals			75		217	

The results are not conclusive but suggest a considerable interference between the nets at ten metres apart and relatively little at twenty metres. Future trials will be made both to repeat the present observations and to increase the distance between nets.

The experiment also yields an estimate of the numbers of eels of the sizes sampled in the area. Making the assumption that half the eels in the two outer nets came from outside the enclosed area, the nets at 20 metres apart

caught $217 - (35 + 28) = 154$. A train of six nets is 42 metres long and the distance between the outer nets was 60 metres; the enclosed area was therefore 2,520 square metres.

On this basis there were about 600 eels to the hectare. The actual population is likely to be considerably higher than this estimate for two reasons. In the first place, some of the eels probably swam between the trains of nets and therefore were not captured. Secondly, other netting experiments have suggested that eels do not necessarily forage every night so that some may have avoided capture by remaining in their burrows.

Silver Eels:

The eels of the Shannon lakes are caught on migration mainly at Killaloe but also at Athlone and at several other points. In the winter 1974/75, E.S.B. personnel measured samples of the catch approximately twice a month. It is not possible to sample silver eels at regular intervals since several days may pass without any being caught. A summary of the measurements is given in Table 4.

The most interesting feature is the absence of male eels from the Athlone samples. (Male eels rarely grow to more than 45 cm and females do not migrate until they have reached a length of 46 cm or more). In the absence of past records of this kind it is not yet possible to judge the significance of the numbers of males at Killaloe but it is believed that they are forming an increasing proportion of the catch.

The absence of males at Athlone suggests that no silver eels have yet developed as a result of the stocking with elvers of lakes upstream of Lough Derg. The first appearance of males at Athlone should be carefully watched for as it will indicate how many years are needed for Shannon eels to begin to reach maturity after stocking. Male and female eels appear to grow at about the same speed but the males mature earlier since they do not need to

reach so large a size as the females. The lakes upstream of Lough Derg have no natural supply of male eels since the males always stay in the lower reaches of river systems. Overland transport of elvers causes the development of a population of males in such places.

The measurements also confirmed the observation that the smaller silver eels migrate earlier than the bigger ones. The proportion of males fell sharply in the February catches as did the proportion of females of less than 60 cm. Females of less than 60 cm were most frequent in October and females of over 80 cm were most plentiful from January onwards.

Elvers and small eels:

Samples of glass eels (elvers which have recently arrived from the sea) were collected on the River Erriff, on March 6 and May 6. They were relatively scarce in March and the sample was collected from fine gravel in the tidal part of the stream. In May they were abundant and the sample came from the waterfall where large numbers were ascending. The mean lengths of both samples were not significantly different from each other. This result contrasted with the observations in 1974 when the May elvers were longer on average than the April sample (Table 3).

The search for elvers in other rivers was unsuccessful, but rather limited in extent. Rivers on the Clare coast gave negative results on April 9 when elvers were also very scarce in the Erriff. In May, when they were plentiful on the Erriff no glass eels were found in four Connemara rivers: Spiddal, Costelloe, Camus and Screebe. The failure to find numbers of glass eels in the Clare and Connemara rivers does not imply that there are no elver runs. It does, however, suggest that the runs are so irregular that there is little hope of establishing viable elver fisheries in them. The Erriff, on the other hand, has given consistently promising results.

At the Parteen trap, 15 km upstream of the tidal water on the Shannon, three samples of ascending eels were taken. As before, a tendency for larger eels to move in May and again in August was noted. The smallest specimens were recorded in July when the majority of eels were less than 15 cm in length. Four eels out of the July sample of 237 were less than 8 cm long and may therefore have reached Parteen from the sea in their first summer in freshwater. The remainder had taken more than one summer to make the journey.

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Table 1. Catch figures.

		Effort	Catch per unit of effort			
		(nets x days)	Numbers	Weight		
				grams	ozs.	
Broadmeadow						
	1972	24	1.2	203	7	
	1973	30	1.9	238	8	
	1974	24	7.1	1179	41	
	1975	16	4.7			
South Sloblands						
	1970	48	15.6	2252	80	
	1972	54	0.3			
	1973	96	4.7	632	22	
	1974	24	6.4	924	32	
	1975	16	14.6	2711	95	
Lough Derg		1969	189	1.6	304	11
Whitegate		1974	32	2.9	468	16
	1975	32	2.9	481	17	
Deep		1974	32	3.3	771	27
	1975	16	4.2	777	27	
Lough Cutra		1974	120	1.0	192	7
	1975	96	0.6	113	4	
River Barrow		Canal	23	4.5	966	34
	River	16	12.8	2822	99	
River Blackwater						
	1972	80	7.6	2359	83	
	1975 (all)	24	5.1			
	1975 (mud)	16	7.3			

Table 2: Lengths (in cm to nearest whole number downwards, percentage of n). Yellow eels from fyke net samples.

	<u>30</u>	<u>40</u>	<u>50</u>	<u>60</u>	<u>70</u>	<u>n</u>	<u>Mean</u>	<u>SE</u>
River Barrow								
Canal	10	44	38	8		110	48.8	0.71
River	12	47	37	4		206	47.6	0.48
Lough Cutra								
1974	29	45	21	5		158	45.2	0.63
1975	17	59	21	3		58	46.1	0.92
South Sloblands								
1970	31	54	10	4	1	408	44.1	0.42
1973	47	47	5		1	455	40.4	0.20
1974	38	54	6	1	1	157	42.0	0.46
1975	21	64	12	2	1	840	44.4	0.25
Lough Derg								
1969	12	54	29	4	1	271	47.4	0.76
Whitegate								
1974	29	53	14	2	2	174	45.0	0.66
1975	27	56	15	2		317	43.9	0.30
Deep								
1974	22	45	20	10	3	91	47.6	1.05
1975	30	58	10	1	1	67	43.5	0.98
River Blackwater								
Ballyduff	53	15	11	12	9	191	45.9	1.01

Table 3: Elver and young eel measurements (percentage of n, lengths to nearest whole number downwards).

Parteen elver trap

Length (cm)	6.8-7	8-9	10-14	15-19	20-24	25-42	<u>n</u>	mean	SE
May 31			4	26	50	20	54	27.4	0.71
July 17	2	24	43	18	9	4	237	13.3	0.33
August 13		3	30	22	21	24	67	19.2	0.88

Erriff glass eels

Length (mm)	55-59	60-64	65-69	70-75	<u>n</u>	mean	SE
March 3	3	9	64	24	33	67.4	0.54
May 6		27	54	19	37	66.8	0.64

Table 4: River Shannon silver eels: length distributions and male/female ratios. (lengths as percentage of n where n = number of each sex in sample)

<u>Males Killaloe</u>							
Length (cm)	30	35	40	n	mean	SE	% of males in sample
October 30	9	55	36	11	38.4	1.0	11
November 20	37	46	17	30	36.3	0.5	30
December 10	18	64	18	11	37.5	0.9	11
19	44	51	5	41	34.9	0.4	31
January 3	29	42	29	7	37.7	1.6	7
15	24	60	16	25	36.2	0.6	23
30	29	29	42	7	37.7	1.4	17
February 4	50	25	25	4	39.8	1.7	5
11		100			35.0	0	3

(No males at Athlone)

<u>Females - Killaloe</u>									
Length (cm)	46	50	60	70	80	90	<u>n</u>	mean	SE
October 30	2	50	24	18	3	2	90	62.4	1.1
November 20	2	14	25	42	11	6	69	70.4	1.1
December 10	3	40	38	12	7		90	62.0	1.0
19	2	18	34	27	13	6	88	68.6	1.2
January 3	3	24	26	26	13	8	95	68.7	1.3
15	1	18	30	39	11	1	83	68.2	1.1
30		12	27	18	38	5	34	74.6	2.0
February 4	1	8	21	45	21	7	75	73.6	1.2
12	3	7	22	47	15	7	73	73.0	1.2

<u>Females - Athlone</u>									
November 14		7	29	43	16	5	100	72.7	0.9
29	2	3	36	41	14	5	103	71.8	0.9
December 18		1	23	49	23	4	102	75.1	0.8
January 7		1	21	45	28	5	100	76.1	0.8